Automatic license plate recognition using pre-processing methods

S.Jyothi, Shaik Azeez, M.Anil, P.Srinu, V.Krishna Chaitanya

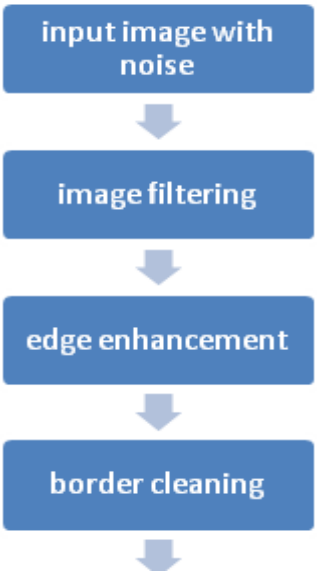
***Abstract*— In this paper, we present a method to automatically detect a vehicle's number by using pre-processing techniques. We also include image enhancement techniques, edge detection methods, morphological methods including image filling and some techniques like image filling. This paper provides an advantage of effective detection of more number of vehicles compared to the detection using edge detection methods.**

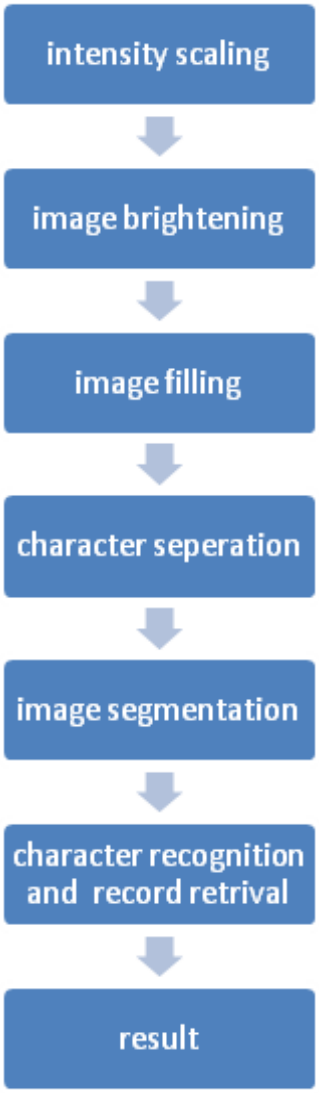
***Index Terms*— enhancement techniques, edge detection methods, morphological methods, image filling.**

I. INTRODUCTION

Vehicle number plate detection has found its vast applications in various fields like parking, access control, border security, car counting on highways (toll gates), traffic violations detection, and surveillance applications. The process involves capturing the vehicle number plate with a camera and applying pre processing techniques using matlab software and obtaining the output on the desktop. The image we captured may be affected by noise. So, image de noising techniques are adopted. Conversion of RGB image to gray scale image is also involved. We included Character Segmentation and Character Recognition. Each of these parts plays an important role in the final accuracy.

II. PROJECT ALGORITHM:





A. Image noise

Noise is an unwanted attribute that is added to an image unintentionally. This noise in an image effects the clarity and hence reducing the efficiency of detecting the vehicles. Generally there are different types of noises that effect an image. But most common noises in any image is Gaussian noise and salt and pepper noise.

Types of noise:

There are different types of noises that effect an image such as Gaussian noise, salt and pepper noise, shot noise, Quantization noise (uniform noise),film grain, anisotropic noise, speckle noise, Poisson noise, etc., but noise we considered is of Gaussian noise and salt and pepper noise.

S.Jyothi, Student of Lendi Institute of Engineering and Technology
Shaik Azeez, Student of Lendi Institute of Engineering and Technology
M.Anil, Student of Lendi Institute of Engineering and Technology
P.Srinu, Student of Lendi Institute of Engineering and Technology
V.Krishna Chaitanya, Assistant Professor of Lendi institute of Engineering and Technology

i. Gaussian noise:

Principal sources of Gaussian noise in digital images arise during acquisition e.g. sensor noise caused by poor illumination and/or high temperature, and/or transmission e.g. electronic circuit noise.

ii. Salt-and-pepper noise:

Fat-tail distributed or impulsive noise is sometimes called salt-and-pepper noise or spike noise. An image containing salt-and-pepper noise will have dark pixels in bright regions and bright pixels in dark regions. This type of noise can be caused by analog-to-digital converter errors, bit errors in transmission, etc. It can be mostly eliminated by using dark frame subtraction, median filtering and interpolating around dark/bright pixels.

The above noises can be removed by using some filtering techniques. Here we are using median filter to remove noise effects.

B. Image filter

In image processing, it is often desirable to remove noise on an image. The median filter is a nonlinear digital filtering technique, which is usually used to remove noise. Median filtering is very widely used in digital image processing because, under certain conditions, it preserves edges while removing noise.

C. Edge enhancement

Contrast enhancement may emphasize brightness differences associated with some linear features. This procedure, however, is not specific for linear features because all elements of the scene
are enhanced equally, not just the linear elements. Digital filters have been developed specifically to enhance edges in images and fall into two categories: directional and non-directional.

D. Border cleaning

The function used is imclearborder(image);.this function suppresses structures that are lighter than their surroundings and that are connected to the image border.

E. Intensity scaling

Intensity scaling can be obtained by multiplying all intensities of an image with a scalar value. Most usually, intensity scaling can change the range of intensities.

F. Image brightening

Image brightening involves adjusting the brightness of an image. The value of brightness will usually be in the range of -255 to +255 for a 24 bit palette. Negative values will darken the image and conversely positive values will brighten the image.

G. . Image filling

Variety of hole filling methods are developed and used. They are Area fill operations, Morphological operations, Flood fill operations. Sometimes a combination of these methods along with image subtraction is used to identify the holes effectively.

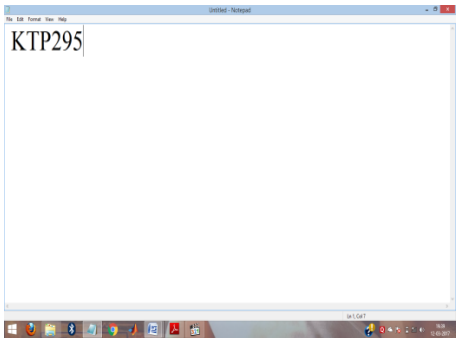
H. character recognition and segmentation

A great variety of segmentation methods has been proposed in the past decades, and some categorization is necessary to present the methods properly here. A disjunction categorization does not seem to be possible though, because even two very different segmentation approaches may share properties that defy singular categorization

III. RESULTS:

Original input image:

Expected output image:



IV. CONCLUSION:

In this system, application software is designed for the detection of number plate of vehicles using their number plate. At first plate location is extracted using morphological operation then separated the plate characters individually by segmentation. We have tested this system on a publicly available English plate data set as well and achieved an overall accuracy of 97%. Finally template matching is applied with the use of correlation for recognition of plate characters.

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PROJECT AUTHORS:

S.Jyothi, Student of Lendi Institute of Engineering and Technology

Shaik Azeez, Student of Lendi Institute of Engineering and Technology

M.Anil, Student of Lendi Institute of Engineering and Technology

P.Srinu, Student of Lendi Institute of Engineering and Technology

V.Krishna Chaitanya, Assistant Professor of Lendi institute of Engineering and Technology